S.N. 10/693,288

AMENDMENTS TO CLAIMS

1. (Currently amended) A method of making a magnetic tunnel junction device, comprising:

~~forming a magnetic tunnel junction stack;~~

~~forming a first mask layer on the magnetic tunnel junction stack;~~

~~patterning the first mask layer;~~

forming a discrete magnetic tunnel junction stack including a pinned layer ~~by etching the first mask layer~~;

forming an electrically non-conductive spacer layer on the discrete magnetic tunnel junction stack, the spacer layer covering sides of the pinned layer; and

forming a spacer by anisotropically etching the spacer layer, the anisotropically-etched spacer covering the sides of the pinned layer.~~;~~

~~forming a dielectric layer over the discrete magnetic tunnel junction stack and the spacer;~~

~~planarizing the dielectric layer to form a substantially planar surface;~~

~~forming a self-aligned via by etching away the first mask layer;~~

~~depositing a first electrically conductive material on the dielectric layer and in the self-aligned via;~~

~~patterning the first electrically conductive material; and~~

~~forming a dual-damascene conductor by etching the first electrically conductive material.~~

2. (Currently amended) The method as set forth in claim [[1]] 20, wherein the depositing of the first electrically conductive material is continued until the first electrically conductive material completely fills the self-aligned via and the first electrically conductive material extends outward of the substantially planar surface by a predetermined distance.

3. (Original) The method as set forth in claim 1, wherein the spacer layer is conformally deposited on the discrete magnetic tunnel junction stack.

4. (Original) The method as set forth in claim 1, wherein the spacer layer comprises a material selected from the group consisting of silicon oxide and silicon nitride.

5. (Original) The method as set forth in claim 1, wherein the anisotropically etching the spacer layer comprises a reactive ion etch.

6. (Currently amended) The method as set forth in claim [[1]] 20, wherein after the forming of the self-aligned via, the discrete magnetic tunnel junction stack and the self-aligned via are not aligned relative to each other.

7. (Currently amended) A method of making a magnetic tunnel junction device from a previously fabricated discrete magnetic tunnel junction stack, the stack including free, spacer and pinned layers, the method comprising: forming an electrically non-conductive spacer layer on the previously fabricated discrete magnetic tunnel junction stack to cover sides of the free, spacer and pinned layers; forming a spacer by anisotropically etching the spacer layer, where the anisotropically-etched spacer covers the sides of the free, spacer and pinned layers; forming a dielectric layer over the previously fabricated discrete magnetic tunnel junction stack and the spacer; planarizing the dielectric layer to form a substantially planar surface; forming a self-aligned via by etching away a first mask layer of the previously fabricated discrete magnetic tunnel junction stack; depositing a first electrically conductive material on the dielectric layer and in the self-aligned via; patterning the first electrically conductive material; and forming a dual-damascene conductor by etching the first electrically conductive material.

8. (Original) The method as set forth in claim 7, wherein the depositing of the first electrically conductive material is continued until the first electrically conductive material completely fills the self-aligned via and the first electrically conductive material extends outward of the substantially planar surface by a predetermined distance.

9. (Original) The method as set forth in claim 7, wherein the spacer layer is conformally deposited on the previously fabricated discrete magnetic tunnel junction stack.

10. (Original) The method as set forth in claim 7, wherein the spacer layer comprises a material selected from the group consisting of silicon oxide and silicon nitride.

11. (Original) The method as set forth in claim 7, wherein the anisotropically etching the spacer layer comprises a reactive ion etch.

12. (Original) The method as set forth in claim 7, wherein after the forming of the self-aligned via, the previously fabricated discrete magnetic tunnel junction stack and the self-aligned via are not aligned relative to each other.

13. (Withdrawn-currently amended) A magnetic tunnel junction device, comprising:

a discrete magnetic tunnel junction stack including free, spacer and pinned layers, the stack having a top portion, a bottom portion, and a side portion; and

an anisotropically-etched electrically non-conductive spacer in contact with the side portion of the stack, including the pinned layer. ~~; a dielectric layer surrounding the spacer; a self-aligned via positioned between the spacer and extending to the top portion; a bottom conductor in electrical communication with the bottom portion; and a dual-damascene conductor including a top conductor and a via that are homogeneously formed with each other, the is via positioned in the self-aligned via, and the via is in contact with the top portion.~~

14. (Withdrawn) The magnetic tunnel junction device as set forth in claim 13, wherein the spacer is made from a material selected from the group consisting of silicon oxide and silicon nitride.

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15. (Withdrawn) The magnetic tunnel junction device as set forth in claim 13, wherein the self-aligned via and the magnetic tunnel junction stack are not aligned relative to each other.

16. (Withdrawn-currently amended) The magnetic tunnel junction device as set forth in claim 13, <u>further comprising a dielectric layer surrounding the spacer; a self-aligned via positioned between the spacer and extending to the top portion; a bottom conductor in electrical communication with the bottom portion; and a dual-damascene conductor including a top conductor and a via that are homogeneously formed with each other, the is via positioned in the self-aligned via, and the via is in contact with the top portion;</u> wherein a portion of the via of the dual-damascene conductor is in contact with the spacer.

17. (Withdrawn-currently amended) The magnetic tunnel junction device as set forth in claim [[13]] <u>16</u> and further comprising: a plurality of the magnetic tunnel devices positioned in a plurality of rows and a plurality of columns of an array; a plurality of row conductors that are aligned with a row direction of the array; and a plurality of column conductors that are aligned with a column direction of the array, each of the plurality of the magnetic tunnel junction devices is positioned between an intersection of one of the row conductors with one of the column conductors, wherein the plurality of row conductors comprises a selected one of the dual-damascene conductor or the bottom conductor, and wherein the plurality of column conductors comprises a selected one of the dual-damascene conductor or the bottom conductor.

18. (Withdrawn) The magnetic tunnel junction device as set forth in claim 17, wherein the array is a MRAM array.

19. (Withdrawn) The magnetic tunnel junction device as set forth in claim 17, wherein the self-aligned via and the magnetic tunnel junction stack are not aligned relative to each other.

20. (New) The method of claim 1, wherein forming the discrete magnetic tunnel junction stacks includes forming a magnetic tunnel junction stack; forming a first mask layer on the magnetic tunnel junction stack; patterning the first mask layer; and forming the discrete magnetic tunnel junction stack by etching the first mask layer; and wherein the method further comprises:

forming a dielectric layer over the discrete magnetic tunnel junction stack and the spacer;

planarizing the dielectric layer to form a substantially planar surface;

forming a self-aligned via by etching away the first mask layer;

depositing a first electrically conductive material on the dielectric layer and in the self-aligned via;

patterning the first electrically conductive material; and

forming a dual-damascene conductor by etching the first electrically conductive material.

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